

Trigonometry — Exam 1
MAT 145, Spring 2017— D. Ivanić

Name: _____
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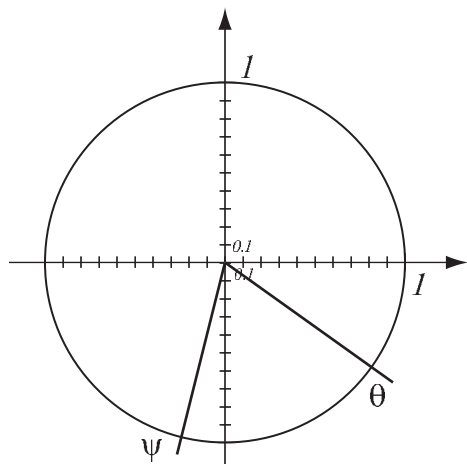
1. (10pts) If θ is an acute angle, find the values of all the trigonometric functions of θ given that $\tan \theta = \frac{1}{5}$. Draw a picture.

2. (12pts) If $\cos \theta = -\frac{2}{5}$ and θ is in the third quadrant, find the exact values of all the trigonometric functions of θ . Draw a picture.

3. (12pts) Without using the calculator, find the exact values of the following trigonometric functions. Draw the unit circle and the appropriate angle to infer the values from the picture.

$$\sin 150^\circ = \quad \cos \frac{5\pi}{4} = \quad \csc(-180^\circ) = \quad \tan \frac{10\pi}{3} =$$

4. (9pts) Use the unit circle to estimate the values of the trigonometric functions of the angles drawn. Note the angles are **not** the standard angles.



$$\sin \theta =$$

$$\sec \theta =$$

$$\cos \psi =$$

$$\tan \psi =$$

5. (6pts) Convert into the other angle measure (radians or degrees). Show how you computed your number.

$$20^\circ =$$

$$\frac{13\pi}{12} \text{ radians} =$$

6. (6pts) Use your calculator to evaluate (round to 6 decimals):

$$\tan 49^\circ =$$

$$\sec \frac{2\pi}{7} =$$

7. (3pts) Use your calculator to find the acute angle θ (in degrees, round to 6 decimals) if

$$\sin \theta = \frac{4}{17}$$

8. (10pts) Draw two periods of the graph of $y = 2\sin(4x + \pi)$.

What is the amplitude? The period?

For each period, indicate x-coordinates of the five special points (middle, peaks, valleys).

9. (10pts) A kite attached to a 110 ft string is flying so that the angle of elevation from the ground anchor to the kite is 35° . How high above the ground is the kite?

10. (10pts) Apple's new headquarters building is in the shape of a ring with outer diameter 460 meters. If we refer to points on the circle via correspondence to a clock, how far would a person have to walk along the outside wall to get from a point at 1 o'clock to a point at 6 o'clock?

11. (12pts) The Earth rotates around the sun on an approximately circular path of radius 91.4 million miles. It takes the Earth 365.25 days for one complete revolution (hence the leap years!).

- a) What is Earth's angular velocity due to this rotation in radians per hour?
- b) What is Earth's linear velocity due to this rotation in miles per hour?

Bonus. (10pts) A circle of radius 16 meters is inscribed in a regular hexagon. Find the exact value of the perimeter of the hexagon (not a calculator approximation).

